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'PATENT'

APPEAL BRIEF TRANSMITTAL FORM

In re application of: Simon C. P. Ashton
U.S. Serial No.: 10/089,310 [810033]
Filed: August 28, 2002
For: Jet Fuels With Improved Flow Properties

) Before the Board of
) Patent Appeals and Interferences
) Examiner: Tam M. Nguyen
)
) Confirmation Number: 7324
) Group Art Unit: 1764
) Family Number: P1999S008

Commissioner for Patents
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KATHLEEN A. KUNA

Name of person signing certification

Kathleen A. Kuna

Signature

MAY 24, 2005

Date

Enclosed is the Appeal Brief in the above-noted application, in triplicate (send in triplicate even when faxing).

The item(s) check below are appropriate:

☒ \$500.00 Fee for Appeal Brief.

☐ Petition for extension of time pursuant to 37 CFR 1.136 and 1.137 is hereby made if,
and to the extent, required. The fee for this extension of time is calculated to be
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:) Before the Board of Patent
Simon C. P. Ashton) Appeals and Interferences
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U. S. Serial No. 10/089,310) Before the Examiner
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Sir:

APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192

Applicant hereby appeals from the Final Rejection of all the claims in this case by
the Examiner.

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U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 2

(1) Real Party in Interest

The real party in interest in this case is Applicant's Assignee, ExxonMobil Research and Engineering Company.

(2) Related Appeals and Interferences

There are no other appeals or interferences pending in this or any related applications which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

(3) Status of Claims

Claims 1-16 are pending in this case and stand rejected by the Examiner under 35 USC § 103(a).

(4) Status of Amendments

Applicant submitted an Amendment After Final Rejection on April 7, 2005 which was within the third month of the three month shortened statutory period within which a reply was due. No Advisory action was received prior to filing the Notice of Appeal on April 19, 2005, but an Advisory Action was mailed on May 17, 2005 and subsequently was received on May 19, 2005 by which the Examiner indicates the request for reconsideration has been considered but does not place the application in condition for allowance.

(5) Summary of Invention

The present invention is directed to a jet fuel blend and a method for producing a jet fuel blend with a depressed freeze point (page 3, lines 13 and 9-11), comprising more than 75% by volume of a kerosene fraction (page 3, lines 20-23)

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 3

boiling within the range of 140 to 250°C (page 3, line 14) and a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil which naphtha fraction has a distillation range of $T_5=165^{\circ}\text{C}$ to $T_{90}=210^{\circ}\text{C}$ (page 3, lines 14-16) an aromatic content of at least 50% by volume (page 3, line 17) such that the resultant jet fuel blend has a freezing point below that of the kerosene prior to blending (page 3, line 17-18) and the total aromatic content of the blend is in the range from 15-25% by volume of the total blend (page 4, lines 4-5). Preferably the kerosene fraction has a boiling range of $T_5=145^{\circ}\text{C}$ to $T_{95}=248^{\circ}\text{C}$ (page 3, lines 20-21). More preferably the kerosene fraction has a boiling range of $T_5=150^{\circ}\text{C}$ to $T_{95}=245^{\circ}\text{C}$ (page 3, lines 21-22). The blend has a freezing point below -53.5°C (page 5, line 8). The blend can contain 80-99% by volume of the kerosene fraction (page 3, line 24). The naphtha fraction (HCCN) can be one which is substantially unhydrorefined and has a boiling range of $T_5=165^{\circ}\text{C}$ to $T_{95}=210^{\circ}\text{C}$ (page 3, line 35 to page 4, line 2). In another embodiment the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend (page 4, lines 5-6). The jet fuel blend can contain one or more additives selected from anti oxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes (page 5, lines 15-19).

(6) Issues

Whether the Examiner properly rejected composition claims 1-8 and method claims 9-16 under 35 USC § 103(a) based on GB 735134.

(7) Grouping of Claims

Applicant elects to have claims 1-8 and claims 9-16 treated as separate groups.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 4

(8) Argument

It is maintained that the Examiner's rejection of claim 1-8 and 9-16 under 35 USC § 103(a) based on GB 735134 is not proper.

The present invention embraced by claims 1-8 is directed to the discovery of a jet fuel comprising more than 75 vol% of a kerosene fraction boiling in the range of 140°C to 250°C and a minor amount of a naphtha fraction made by catalytic cracking of a heavy gas oil (HCCN) which has a distillation range of $T_5 = 165^\circ\text{C}$ to $T_{90} = 210^\circ\text{C}$, and an aromatic content of at least 50 vol% such that upon blending the resultant jet fuel blend has a freezing point lower than that of the kerosene prior to the blending, the total aromatic content of the blend being in the range of 15-25 vol% of the total blend.

The present invention, embraced by claims 9-16 is also directed to a method for producing a jet fuel blend having a freezing point lower than that of the primary kerosene component prior to blending comprising combining more than 75% by volume of kerosene having a boiling range between 140°C to 250°C with a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (HCCN) which naphtha has a boiling range of $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$ and an aromatic content of at least 50% by volume to produce a jet fuel blend of reduced freeze point and a total aromatic content in the range of 15-25% by volume of the total blend.

The Examiner rejects the claimed invention under 35 U.S.C. § 103(a) as obvious over GB 735,134.

The Examiner argues that GB 735,134 discloses a process for producing a jet fuel comprising a kerosene fraction and a naphtha fraction.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 5

The Examiner points out that in GB 735,134 the naphtha fraction produced by cat cracking has a boiling point (actually a boiling range) of 138 to 177°C while the kerosene has a boiling point (again, actually boiling range) of 167 to 287°C, the naphtha fraction being rich in aromatics, wherein, upon blending the recited kerosene fraction and naphtha fraction the resulting blend has a total aromatics content of about 20 to 25 wt%. In producing the blend GB 735,134 recites that the heavy naphtha fraction boiling between (i.e., having a boiling range of 280°F to 350°F and containing C₈-C₉ aromatics is blended with the kerosene in an amount sufficient to contribute at least from 0.5 to 2.0% by volume of C₈-C₉ aromatics to the blend, the final jet fuel blend having a freezing point of lower than -76°F (60°C).

The Examiner concludes that it would be expected that the jet fuel would have a freezing point below that of the kerosene prior to blending as is claimed in the present application.

The Examiner argues that it would have been obvious to use naphtha fractions and kerosene fractions having the claimed range because one of skill in the art would utilize any naphtha fraction having a boiling point of from 280-350°F (138-177°C) and any kerosene fraction having a boiling point of from 330-550°F (167-287°C) including the overlapping claimed ranges with the expectation that any fraction having a boiling point within the range would give similar results.

Applicant respectfully traverses this rejection.

GB 735,134 teaches a very specific fuel composition with respect to the jet fuel aspect of its disclosure.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 6

The jet fuel comprises kerosene and C₈-C₉ aromatics, this particular jet fuel composition being marked by an ability to resist fuel filter plugging by ice crystals.

The text at page 3, columns 32-39, is specific in its recitation that it is the C₈-C₉ aromatics that are particularly beneficial in the fuels.

The naphtha fraction is identified as that boiling in the 280-350°F (138-177°C) range. It must be noted from page 6, lines 20-29, that C₈ and C₉ aromatics are again identified, the highest boiling C₈ aromatics being orthoxylene (BP 291.95°F or about 144°C), the highest boiling C₉ aromatic being hemimellitene (BP 335°F or about 168°C).

Thus, the boiling range for the naphtha of between about 138-177°C is not arbitrary nor non-limiting or merely suggestive of other broader ranges.

When GB 735,134 recites a naphtha boiling range of 280-350°F (138-177°C), it means precisely this range.

Boiling range should not be confused with boiling point. A pure compound has a discrete boiling point. Mixtures of compounds such as naphtha have boiling ranges. A naphtha defined as having a boiling range between T₅ = 165°C to T₉₅ = 210°C is not the same material as a pure compound having a discrete boiling point nor is it the same as a mixture having a boiling range between 138-177°C, despite what appears to be an overlap.

The naphtha having a boiling range of T₅ = 165°C to T₉₅ = 210°C defines a material at which at 165°C 5% of the material boils off and at 210°C 95% of the material boils off. This product boiling between T₅ = 165°C to T₉₅ = 210°C defines the naphtha fraction used in the present invention.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 7

This fraction is heavier than, and outside the range of material covered in GB 735,134 in its definition of C₈-C₉ aromatics boiling in the range 280-350°F (i.e., 138-177°C), that is, a naphtha fraction having an end point temperature of 350°F (177°C).

A naphtha fraction having an end point of 177°C is much lighter and much different than a naphtha fraction boiling between T₅ = 165°C to T₉₅ = 210°C, the end point being even a few degrees C higher than the T₉₅ = 210°C temperature.

Thus, the fractions are not the same despite what appears to be an area of overlap. The recitation of a boiling range or an end point of 350°F does not teach, suggest or imply using or isolating a particular single molecule at a single temperature in the range but rather using a fraction boiling within the entire recited range. In the present invention the naphtha fraction used is the whole fraction boiling between T₅ = 165°C to T₉₅ = 210°C, whereas in the reference the aromatic are C₈-C₉ aromatics or naphtha fraction having an end point of 350°F (~ 177°C), that is, material boiling above 177°C is excluded.

This teaching of a naphtha fraction having an end point of 350°F (~ 177°C) does not teach, suggest or imply using a naphtha fraction having a T₉₅ point of 210°C, nor, based on the teaching of the entire reference does it teach, suggest or imply that the freeze point of kerosene, the temperature at which wax crystallizes, can be lowered by adding such a T₅ = 165°C to T₉₅ = 210°C naphtha fraction to such kerosene.

The recitation in the reference that it is an object of the reference invention to produce a jet fuel with a freeze point of -76°F (-60°C) should not and cannot be read as a teaching that it is the addition of the C₈-C₉ aromatics which achieves this freeze

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 8

point. The -76°F (-60°C) freeze point temperature is merely the repetition of the heretofore recited JP-1, JP-3 and JP-4 turbine fuel freezing point specification from Table 1.

In Table 1, the specification is for jet fuel of any type produced by any technique. The -76°F freeze point specification in Table 1, therefore, is not a recitation that the jet fuel of the reference achieves that temperature by the addition of C₈-C₉ aromatics, but is rather a recitation that regardless of how the fuel is finally prepared the fuel has to have or meet a freeze point spec of -76°F (-60°C) or else be rejected as "off-spec".

The -76°F temperature is just the government's military specification for the acceptable freeze point of jet fuel.

It is not specified in the Mil-Spec just how this is to be achieved. A freeze point of -76° could be reached by use of approved wax crystal modifier/pour point/freeze point depressant additives such as those taught in EP-A-0282342, cited at page 1 of the present application.

The present reference, specifying that it reduces the ability of jet fuel to form ice crystals by the addition of C₈-C₉ aromatic (naphtha with an end point of 350°F (~ 177°C)) does not teach, suggest or imply that kerosene can have its wax crystal formation freeze point lowered by the addition thereto of a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil which naphtha fraction has a boiling range of T₅ = 165°C to T₉₅ = 210°C.

The Examiner rejects claims 1, 3 and 4 over GB 735,134 arguing that although the reference does not disclose the claimed boiling ranges of the naphtha and kerosene fractions the reference discloses that the naphtha fraction has a "boiling

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 9

point" of from 280°F to 350°F (138-177°C) and the kerosene has a "boiling point" of from 330-550°F (167-287°C).

The Examiner by arguing that it would have been obvious to utilize naphtha and kerosene fractions having the presently claimed ranges because "one of skill in the art would utilize any naphtha fraction having a boiling point of from 280-350°F (138-177°C) or kerosene fraction having a boiling point of from 330-550°F (167-287°C) including the overlapped claimed ranges with the expectation that any fraction having a boiling point within the ranges would give similar results" is clearly indicating that he is confusing boiling point and boiling range. Boiling "point" and boiling "range" are not the same.

As previously indicated kerosene and naphtha are not discrete, pure, individual hydrocarbons but mixtures of hydrocarbons.

When discussing a hydrocarbon mixture one does not talk about boiling point but rather the boiling range over which material is recovered, i.e., the fraction is identified in terms of the temperature range over which it is recovered, e.g., $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$. Such fractions have an initial boiling point, a temperature at which a first drop of material is recovered and a final boiling point, a temperature at which a last or final drop of material is recovered, the initial boiling point and final boiling point constituting the boiling range.

In the reference the kerosene is defined as boiling between 330 to 550°F, that is the kerosene used in the reference is that fraction which is recovered with a first drop at 330°F and the last drop at 550°F. Those portions boiling below 330°F and above 550°F are excluded. Similarly, defining the naphtha as boiling between 280°F to 350°F (138-177°C) defines a naphtha fraction the first drop of which is recovered at 280°F and the last drop of which is recovered at 350°F. This entire fraction

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 10

recovered at between 280°F to 350°F is the fraction used or suggested in the GB reference.

In the present invention the cat naphtha used is the complete fraction having a boiling range between T₅ of 165°C to T₉₅ of 210°C. In the present invention use is not being made of some arbitrary sub-fraction recovered from the material boiling between T₅ of 165°C to T₉₅ of 210°C but rather the complete range of material boiling between these temperatures is used in its entirety.

The Examiner, from the quoted language, appears to be indicating that it would have been obvious to use a subfraction boiling at a particular temperature within the range recited in the GB reference and appears to be arguing that all applicant is doing is reciting a temperature range which overlaps that of the reference and that it would be obvious to take a particular sub-portion boiling at some arbitrary temperature, within the recited new temperature range and also within the range taught in the GB reference and use it in the present invention.

This is believed to be an error on the part of the Examiner.

Applicant recites a boiling range for the cat naphtha used in the present invention. That cat naphtha used in the present invention is the entire fraction boiling between a T₅ of 165°C to T₉₅ of 210°C, whereas the GB reference recites a naphtha fraction boiling between an initial boiling point of 138°C to a final boiling point of 177°C. In each instance it is the use of the entire fraction in producing the blend which is taught.

The present invention does not seek to claim the use of a particular limited portion of the fraction boiling between T₅ = 165°C and T₉₅ = 210°C but uses the entire fraction boiling between these limits.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 11

A hydrocarbon fraction boiling in the range initial boiling point 138°C to final boiling point of 177°C is not the same as a hydrocarbon fraction boiling in the range of T₅ of 165°C to T₉₅ of 210°C. The hydrocarbon fraction boiling in the range of T₅ of 165°C to T₉₅ of 210°C is heavier than the hydrocarbon fraction boiling in the range of initial boiling point 138°C to final boiling point 177°C.

Even when page 10, lines 83-98, are considered which recites at lines 92-94, the use of:

“(3) a heavy hydroformate or a heavy catalytic naphtha rich in C₈-C₉ aromatics and boiling from 250°F to 400°F” (about 121 to about 204°C)”,

the complete fraction recited in the present invention boiling between T₅ of 165°C to T₉₅ of 210°C, is seen to be different, the different boiling ranges of the fractions clearly defining different naphthas.

One skilled in the art does not expect different hydrocarbon fractions having different boiling ranges, even if there is some overlaps in the boiling range, to behave similarly.

The fraction taught by the reference boiling in the range of initial boiling point 138°C to final boiling point 177°C (or considering column 10, lines 92-94, initial boiling point 121°C to final boiling point 204°C) defines a hydrocarbon material containing a substantial amount of material which boils below the T₅ = 165°C of the cat naphtha hydrocarbon materials recited in the present invention, while the cat naphtha hydrocarbon used in the present invention having a T₉₅ = 210°C contains a significant amount of hydrocarbon materials boiling above the final boiling end point of 177°C or 204°C of the naphtha recited in the reference.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 12

The absence of the light ends from, and presence of the heavier ends in, the cat naphtha used in the present invention as compared to the naphtha recited in GB reference reveals that the two fractions are different and the teaching of the GB reference does not teach, suggest or imply that a jet fuel can or should be made using the cat naphtha recited in the present invention ($T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$) or that the freeze point of a jet fuel can be reduced to a temperature below that of the starting kerosene by addition thereto of such a different cat naphtha of such a different boiling range.

With respect to the method claims, it is believed the method of claims 9-16 is not taught, suggested or implied by GB 735,134 for the same reasons that the fuel composition of claims 1-8 is not taught, suggested or implied by that reference as discussed above. The GB reference never prepared the present blend using the presently disclosed kerosene and naphtha fraction or measured its freeze point or suggested that the wax freeze point of kerosene based jet fuel could be reduced by addition to the kerosene of a quantity of the particular naphtha fraction recovered from the catalytic cracking of having gas oil which naphtha has a distillation range of $T_5 = 165^{\circ}\text{C}$ and $T_{95} = 210^{\circ}\text{C}$, because the reference only teaches and uses the very specific naphtha fraction boiling in the range of initial boiling point 138°C to final boiling point 177°C or initial boiling point 121°C to final boiling point 204°C (column 10, lines 92-94) whereas the cat naphtha used in the present method claims 9-16 is a different material than that taught in the reference as clearly indicated by the present cat naphtha having a different and unsuggested, untaught and unimplied boiling range.


U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 13

Relief Sought

It is requested that the Board reconsider this case in light of the above remarks, that it reverse the Examiner, direct that the rejections be withdrawn, the claims be allowed and the case be passed to issue in due course. Applicant's attorney waivers oral hearing.

Respectfully submitted,



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☒ Pursuant to 37 CFR 1.34(a)

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U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 14

CLAIMS ON APPEAL

1. A jet fuel blend comprising more than 75 % by volume of a kerosene fraction boiling within the range of 140° to 250°C and a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (hereafter "HCCN") which naphtha fraction has a distillation range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$, an aromatics content of at least 50 % by volume such that the resultant jet fuel blend has a freezing point below that of the kerosene prior to blending and that the total aromatic content of the blend is in the range from 15-25% by volume of the total blend.

2. The blend according to Claim 1 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 145^{\circ}\text{C}$ to $T_{95} = 248^{\circ}\text{C}$.

3. The blend according to Claim 1 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 150^{\circ}\text{C}$ to $T_{95} = 245^{\circ}\text{C}$.

4. The blend according to Claim 1, 2 or 3 wherein the freezing point of the blend is below -53.5°C .

5. The blend according to Claim 1, 2 or 3 wherein the amount of the kerosene fraction in the jet fuel blend is in the range of 80-99% by volume of the total blend comprising the kerosene fraction and the HCCN.

6. The blend according to Claim 1, 2 or 3 wherein the HCCN fraction is substantially unhydrorefined and has a boiling range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$.

7. The blend according to Claim 1, 2 or 3 wherein the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
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Family Number: P1999S008

Page 15

8. The jet fuel blend composition according to Claim 1, 2 or 3 wherein said composition also contains one or more additives selected from antioxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes.

9. A method for producing a jet fuel blend comprising kerosene which blend has a freezing point below that of the kerosene prior to the blending comprising combining a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (hereafter HCCN) which naphtha fraction has a distillation range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$ and an aromatic content of at least 50% by volume with a kerosene fraction comprising more than 75% by volume of the jet fuel blend, said kerosene fraction boiling in the range of 140° to 250°C , such that upon blending the resultant jet fuel blend has a total aromatic content in the range from 15-25% by volume of the total blend.

10. The method according to Claim 9 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 145^{\circ}\text{C}$ to $T_{95} = 248^{\circ}\text{C}$.

11. The method according to Claim 9 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 150^{\circ}\text{C}$ to $T_{95} = 245^{\circ}\text{C}$.

12. The method according to Claim 9, 10 or 11 wherein the freezing point of the blend is below -53.5°C .

13. The method according to Claim 9, 10, or 11 wherein the amount of the kerosene fraction in the jet fuel blend is in the range of 80-99% by volume of the total blend comprising the kerosene fraction and the HCCN.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 16

14. The method according to Claim 9, 10, or 11 wherein the HCCN fraction is substantially unhydrorefined and has a boiling range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$.

15. The method according to Claim 9, 10, or 11 wherein the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend.

16. The jet fuel blend composition according to Claim 9, 10 or 11 wherein said composition also contains one or more additives selected from antioxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes.

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<u>Kathleen A. KUNA</u>	<u>Kathleen A. Kuna</u>	<u>MAY 24 2005</u>
Name of person signing certification	Signature	Date



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U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 2

(1) Real Party in Interest

The real party in interest in this case is Applicant's Assignee, ExxonMobil Research and Engineering Company.

(2) Related Appeals and Interferences

There are no other appeals or interferences pending in this or any related applications which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

(3) Status of Claims

Claims 1-16 are pending in this case and stand rejected by the Examiner under 35 USC § 103(a).

(4) Status of Amendments

Applicant submitted an Amendment After Final Rejection on April 7, 2005 which was within the third month of the three month shortened statutory period within which a reply was due. No Advisory action was received prior to filing the Notice of Appeal on April 19, 2005, but an Advisory Action was mailed on May 17, 2005 and subsequently was received on May 19, 2005 by which the Examiner indicates the request for reconsideration has been considered but does not place the application in condition for allowance.

(5) Summary of Invention

The present invention is directed to a jet fuel blend and a method for producing a jet fuel blend with a depressed freeze point (page 3, lines 13 and 9-11), comprising more than 75% by volume of a kerosene fraction (page 3, lines 20-23)

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 3

boiling within the range of 140 to 250°C (page 3, line 14) and a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil which naphtha fraction has a distillation range of $T_5=165^{\circ}\text{C}$ to $T_{90}=210^{\circ}\text{C}$ (page 3, lines 14-16) an aromatic content of at least 50% by volume (page 3, line 17) such that the resultant jet fuel blend has a freezing point below that of the kerosene prior to blending (page 3, line 17-18) and the total aromatic content of the blend is in the range from 15-25% by volume of the total blend (page 4, lines 4-5). Preferably the kerosene fraction has a boiling range of $T_5=145^{\circ}\text{C}$ to $T_{95}=248^{\circ}\text{C}$ (page 3, lines 20-21). More preferably the kerosene fraction has a boiling range of $T_5=150^{\circ}\text{C}$ to $T_{95}=245^{\circ}\text{C}$ (page 3, lines 21-22). The blend has a freezing point below -53.5°C (page 5, line 8). The blend can contain 80-99% by volume of the kerosene fraction (page 3, line 24). The naphtha fraction (HCCN) can be one which is substantially unhydrorefined and has a boiling range of $T_5=165^{\circ}\text{C}$ to $T_{95}=210^{\circ}\text{C}$ (page 3, line 35 to page 4, line 2). In another embodiment the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend (page 4, lines 5-6). The jet fuel blend can contain one or more additives selected from anti oxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes (page 5, lines 15-19).

(6) Issues

Whether the Examiner properly rejected composition claims 1-8 and method claims 9-16 under 35 USC § 103(a) based on GB 735134.

(7) Grouping of Claims

Applicant elects to have claims 1-8 and claims 9-16 treated as separate groups.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 4

(8) Argument

It is maintained that the Examiner's rejection of claim 1-8 and 9-16 under 35 USC § 103(a) based on GB 735134 is not proper.

The present invention embraced by claims 1-8 is directed to the discovery of a jet fuel comprising more than 75 vol% of a kerosene fraction boiling in the range of 140°C to 250°C and a minor amount of a naphtha fraction made by catalytic cracking of a heavy gas oil (HCCN) which has a distillation range of $T_5 = 165^\circ\text{C}$ to $T_{90} = 210^\circ\text{C}$, and an aromatic content of at least 50 vol% such that upon blending the resultant jet fuel blend has a freezing point lower than that of the kerosene prior to the blending, the total aromatic content of the blend being in the range of 15-25 vol% of the total blend.

The present invention, embraced by claims 9-16 is also directed to a method for producing a jet fuel blend having a freezing point lower than that of the primary kerosene component prior to blending comprising combining more than 75% by volume of kerosene having a boiling range between 140°C to 250°C with a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (HCCN) which naphtha has a boiling range of $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$ and an aromatic content of at least 50% by volume to produce a jet fuel blend of reduced freeze point and a total aromatic content in the range of 15-25% by volume of the total blend.

The Examiner rejects the claimed invention under 35 U.S.C. § 103(a) as obvious over GB 735,134.

The Examiner argues that GB 735,134 discloses a process for producing a jet fuel comprising a kerosene fraction and a naphtha fraction.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 5

The Examiner points out that in GB 735,134 the naphtha fraction produced by cat cracking has a boiling point (actually a boiling range) of 138 to 177°C while the kerosene has a boiling point (again, actually boiling range) of 167 to 287°C, the naphtha fraction being rich in aromatics, wherein, upon blending the recited kerosene fraction and naphtha fraction the resulting blend has a total aromatics content of about 20 to 25 wt%. In producing the blend GB 735,134 recites that the heavy naphtha fraction boiling between (i.e., having a boiling range of 280°F to 350°F and containing C₈-C₉ aromatics is blended with the kerosene in an amount sufficient to contribute at least from 0.5 to 2.0% by volume of C₈-C₉ aromatics to the blend, the final jet fuel blend having a freezing point of lower than -76°F (60°C).

The Examiner concludes that it would be expected that the jet fuel would have a freezing point below that of the kerosene prior to blending as is claimed in the present application.

The Examiner argues that it would have been obvious to use naphtha fractions and kerosene fractions having the claimed range because one of skill in the art would utilize any naphtha fraction having a boiling point of from 280-350°F (138-177°C) and any kerosene fraction having a boiling point of from 330-550°F (167-287°C) including the overlapping claimed ranges with the expectation that any fraction having a boiling point within the range would give similar results.

Applicant respectfully traverses this rejection.

GB 735,134 teaches a very specific fuel composition with respect to the jet fuel aspect of its disclosure.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 6

The jet fuel comprises kerosene and C₈-C₉ aromatics, this particular jet fuel composition being marked by an ability to resist fuel filter plugging by ice crystals.

The text at page 3, columns 32-39, is specific in its recitation that it is the C₈-C₉ aromatics that are particularly beneficial in the fuels.

The naphtha fraction is identified as that boiling in the 280-350°F (138-177°C) range. It must be noted from page 6, lines 20-29, that C₈ and C₉ aromatics are again identified, the highest boiling C₈ aromatics being orthoxylene (BP 291.95°F or about 144°C), the highest boiling C₉ aromatic being hemimellitene (BP 335°F or about 168°C).

Thus, the boiling range for the naphtha of between about 138-177°C is not arbitrary nor non-limiting or merely suggestive of other broader ranges.

When GB 735,134 recites a naphtha boiling range of 280-350°F (138-177°C), it means precisely this range.

Boiling range should not be confused with boiling point. A pure compound has a discrete boiling point. Mixtures of compounds such as naphtha have boiling ranges. A naphtha defined as having a boiling range between T₅ = 165°C to T₉₅ = 210°C is not the same material as a pure compound having a discrete boiling point nor is it the same as a mixture having a boiling range between 138-177°C, despite what appears to be an overlap.

The naphtha having a boiling range of T₅ = 165°C to T₉₅ = 210°C defines a material at which at 165°C 5% of the material boils off and at 210°C 95% of the material boils off. This product boiling between T₅ = 165°C to T₉₅ = 210°C defines the naphtha fraction used in the present invention.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 7

This fraction is heavier than, and outside the range of material covered in GB 735,134 in its definition of C₈-C₉ aromatics boiling in the range 280-350°F (i.e., 138-177°C), that is, a naphtha fraction having an end point temperature of 350°F (177°C).

A naphtha fraction having an end point of 177°C is much lighter and much different than a naphtha fraction boiling between T₅ = 165°C to T₉₅ = 210°C, the end point being even a few degrees C higher than the T₉₅ = 210°C temperature.

Thus, the fractions are not the same despite what appears to be an area of overlap. The recitation of a boiling range or an end point of 350°F does not teach, suggest or imply using or isolating a particular single molecule at a single temperature in the range but rather using a fraction boiling within the entire recited range. In the present invention the naphtha fraction used is the whole fraction boiling between T₅ = 165°C to T₉₅ = 210°C, whereas in the reference the aromatic are C₈-C₉ aromatics or naphtha fraction having an end point of 350°F (~ 177°C), that is, material boiling above 177°C is excluded.

This teaching of a naphtha fraction having an end point of 350°F (~ 177°C) does not teach, suggest or imply using a naphtha fraction having a T₉₅ point of 210°C, nor, based on the teaching of the entire reference does it teach, suggest or imply that the freeze point of kerosene, the temperature at which wax crystallizes, can be lowered by adding such a T₅ = 165°C to T₉₅ = 210°C naphtha fraction to such kerosene.

The recitation in the reference that it is an object of the reference invention to produce a jet fuel with a freeze point of -76°F (-60°C) should not and cannot be read as a teaching that it is the addition of the C₈-C₉ aromatics which achieves this freeze

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 8

point. The -76°F (-60°C) freeze point temperature is merely the repetition of the heretofore recited JP-1, JP-3 and JP-4 turbine fuel freezing point specification from Table 1.

In Table 1, the specification is for jet fuel of any type produced by any technique. The -76°F freeze point specification in Table 1, therefore, is not a recitation that the jet fuel of the reference achieves that temperature by the addition of C₈-C₉ aromatics, but is rather a recitation that regardless of how the fuel is finally prepared the fuel has to have or meet a freeze point spec of -76°F (-60°C) or else be rejected as "off-spec".

The -76°F temperature is just the government's military specification for the acceptable freeze point of jet fuel.

It is not specified in the Mil-Spec just how this is to be achieved. A freeze point of -76° could be reached by use of approved wax crystal modifier/pour point/freeze point depressant additives such as those taught in EP-A-0282342, cited at page 1 of the present application.

The present reference, specifying that it reduces the ability of jet fuel to form ice crystals by the addition of C₈-C₉ aromatic (naphtha with an end point of 350°F (~ 177°C)) does not teach, suggest or imply that kerosene can have its wax crystal formation freeze point lowered by the addition thereto of a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil which naphtha fraction has a boiling range of T₅ = 165°C to T₉₅ = 210°C.

The Examiner rejects claims 1, 3 and 4 over GB 735,134 arguing that although the reference does not disclose the claimed boiling ranges of the naphtha and kerosene fractions the reference discloses that the naphtha fraction has a "boiling

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 9

point" of from 280°F to 350°F (138-177°C) and the kerosene has a "boiling point" of from 330-550°F (167-287°C).

The Examiner by arguing that it would have been obvious to utilize naphtha and kerosene fractions having the presently claimed ranges because "one of skill in the art would utilize any naphtha fraction having a boiling point of from 280-350°F (138-177°C) or kerosene fraction having a boiling point of from 330-550°F (167-287°C) including the overlapped claimed ranges with the expectation that any fraction having a boiling point within the ranges would give similar results" is clearly indicating that he is confusing boiling point and boiling range. Boiling "point" and boiling "range" are not the same.

As previously indicated kerosene and naphtha are not discrete, pure, individual hydrocarbons but mixtures of hydrocarbons.

When discussing a hydrocarbon mixture one does not talk about boiling point but rather the boiling range over which material is recovered, i.e., the fraction is identified in terms of the temperature range over which it is recovered, e.g., $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$. Such fractions have an initial boiling point, a temperature at which a first drop of material is recovered and a final boiling point, a temperature at which a last or final drop of material is recovered, the initial boiling point and final boiling point constituting the boiling range.

In the reference the kerosene is defined as boiling between 330 to 550°F, that is the kerosene used in the reference is that fraction which is recovered with a first drop at 330°F and the last drop at 550°F. Those portions boiling below 330°F and above 550°F are excluded. Similarly, defining the naphtha as boiling between 280°F to 350°F (138-177°C) defines a naphtha fraction the first drop of which is recovered at 280°F and the last drop of which is recovered at 350°F. This entire fraction

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 10

recovered at between 280°F to 350°F is the fraction used or suggested in the GB reference.

In the present invention the cat naphtha used is the complete fraction having a boiling range between T₅ of 165°C to T₉₅ of 210°C. In the present invention use is not being made of some arbitrary sub-fraction recovered from the material boiling between T₅ of 165°C to T₉₅ of 210°C but rather the complete range of material boiling between these temperatures is used in its entirety.

The Examiner, from the quoted language, appears to be indicating that it would have been obvious to use a subfraction boiling at a particular temperature within the range recited in the GB reference and appears to be arguing that all applicant is doing is reciting a temperature range which overlaps that of the reference and that it would be obvious to take a particular sub-portion boiling at some arbitrary temperature, within the recited new temperature range and also within the range taught in the GB reference and use it in the present invention.

This is believed to be an error on the part of the Examiner.

Applicant recites a boiling range for the cat naphtha used in the present invention. That cat naphtha used in the present invention is the entire fraction boiling between a T₅ of 165°C to T₉₅ of 210°C, whereas the GB reference recites a naphtha fraction boiling between an initial boiling point of 138°C to a final boiling point of 177°C. In each instance it is the use of the entire fraction in producing the blend which is taught.

The present invention does not seek to claim the use of a particular limited portion of the fraction boiling between T₅ = 165°C and T₉₅ = 210°C but uses the entire fraction boiling between these limits.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 11

A hydrocarbon fraction boiling in the range initial boiling point 138°C to final boiling point of 177°C is not the same as a hydrocarbon fraction boiling in the range of T₅ of 165°C to T₉₅ of 210°C. The hydrocarbon fraction boiling in the range of T₅ of 165°C to T₉₅ of 210°C is heavier than the hydrocarbon fraction boiling in the range of initial boiling point 138°C to final boiling point 177°C.

Even when page 10, lines 83-98, are considered which recites at lines 92-94, the use of:

“(3) a heavy hydroformate or a heavy catalytic naphtha rich in C₈-C₉ aromatics and boiling from 250°F to 400°F” (about 121 to about 204°C)”,

the complete fraction recited in the present invention boiling between T₅ of 165°C to T₉₅ of 210°C, is seen to be different, the different boiling ranges of the fractions clearly defining different naphthas.

One skilled in the art does not expect different hydrocarbon fractions having different boiling ranges, even if there is some overlaps in the boiling range, to behave similarly.

The fraction taught by the reference boiling in the range of initial boiling point 138°C to final boiling point 177°C (or considering column 10, lines 92-94, initial boiling point 121°C to final boiling point 204°C) defines a hydrocarbon material containing a substantial amount of material which boils below the T₅ = 165°C of the cat naphtha hydrocarbon materials recited in the present invention, while the cat naphtha hydrocarbon used in the present invention having a T₉₅ = 210°C contains a significant amount of hydrocarbon materials boiling above the final boiling end point of 177°C or 204°C of the naphtha recited in the reference.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 12

The absence of the light ends from, and presence of the heavier ends in, the cat naphtha used in the present invention as compared to the naphtha recited in GB reference reveals that the two fractions are different and the teaching of the GB reference does not teach, suggest or imply that a jet fuel can or should be made using the cat naphtha recited in the present invention ($T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$) or that the freeze point of a jet fuel can be reduced to a temperature below that of the starting kerosene by addition thereto of such a different cat naphtha of such a different boiling range.

With respect to the method claims, it is believed the method of claims 9-16 is not taught, suggested or implied by GB 735,134 for the same reasons that the fuel composition of claims 1-8 is not taught, suggested or implied by that reference as discussed above. The GB reference never prepared the present blend using the presently disclosed kerosene and naphtha fraction or measured its freeze point or suggested that the wax freeze point of kerosene based jet fuel could be reduced by addition to the kerosene of a quantity of the particular naphtha fraction recovered from the catalytic cracking of having gas oil which naphtha has a distillation range of $T_5 = 165^{\circ}\text{C}$ and $T_{95} = 210^{\circ}\text{C}$, because the reference only teaches and uses the very specific naphtha fraction boiling in the range of initial boiling point 138°C to final boiling point 177°C or initial boiling point 121°C to final boiling point 204°C (column 10, lines 92-94) whereas the cat naphtha used in the present method claims 9-16 is a different material than that taught in the reference as clearly indicated by the present cat naphtha having a different and unsuggested, untaught and unimplied boiling range.

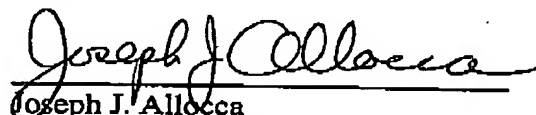
U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 13

Relief Sought

It is requested that the Board reconsider this case in light of the above remarks, that it reverse the Examiner, direct that the rejections be withdrawn, the claims be allowed and the case be passed to issue in due course. Applicant's attorney waives oral hearing.

Respectfully submitted,



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☒ Pursuant to 37 CFR 1.34(a)

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U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 14

CLAIMS ON APPEAL

1. A jet fuel blend comprising more than 75 % by volume of a kerosene fraction boiling within the range of 140° to 250°C and a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (hereafter "HCCN") which naphtha fraction has a distillation range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$, an aromatics content of at least 50 % by volume such that the resultant jet fuel blend has a freezing point below that of the kerosene prior to blending and that the total aromatic content of the blend is in the range from 15-25% by volume of the total blend.
2. The blend according to Claim 1 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 145^{\circ}\text{C}$ to $T_{95} = 248^{\circ}\text{C}$.
3. The blend according to Claim 1 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 150^{\circ}\text{C}$ to $T_{95} = 245^{\circ}\text{C}$.
4. The blend according to Claim 1, 2 or 3 wherein the freezing point of the blend is below -53.5°C .
5. The blend according to Claim 1, 2 or 3 wherein the amount of the kerosene fraction in the jet fuel blend is in the range of 80-99% by volume of the total blend comprising the kerosene fraction and the HCCN.
6. The blend according to Claim 1, 2 or 3 wherein the HCCN fraction is substantially unhydrotreated and has a boiling range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$.
7. The blend according to Claim 1, 2 or 3 wherein the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 15

8. The jet fuel blend composition according to Claim 1, 2 or 3 wherein said composition also contains one or more additives selected from antioxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes.
9. A method for producing a jet fuel blend comprising kerosene which blend has a freezing point below that of the kerosene prior to the blending comprising combining a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (hereafter HCCN) which naphtha fraction has a distillation range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$ and an aromatic content of at least 50% by volume with a kerosene fraction comprising more than 75% by volume of the jet fuel blend, said kerosene fraction boiling in the range of 140° to 250°C , such that upon blending the resultant jet fuel blend has a total aromatic content in the range from 15-25% by volume of the total blend.
10. The method according to Claim 9 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 145^{\circ}\text{C}$ to $T_{95} = 248^{\circ}\text{C}$.
11. The method according to Claim 9 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 150^{\circ}\text{C}$ to $T_{95} = 245^{\circ}\text{C}$.
12. The method according to Claim 9, 10 or 11 wherein the freezing point of the blend is below -53.5°C .
13. The method according to Claim 9, 10, or 11 wherein the amount of the kerosene fraction in the jet fuel blend is in the range of 80-99% by volume of the total blend comprising the kerosene fraction and the HCCN.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 16

14. The method according to Claim 9, 10, or 11 wherein the HCCN fraction is substantially unhydrorefined and has a boiling range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$.

15. The method according to Claim 9, 10, or 11 wherein the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend.

16. The jet fuel blend composition according to Claim 9, 10 or 11 wherein said composition also contains one or more additives selected from antioxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes.

"PATENT"

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	Before the Board of Patent
Simon C. P. Ashton)	Appeals and Interferences
)	
U. S. Serial No. 10/089,310)	Before the Examiner
)	Tam M. Nguyen
Filed: August 28, 2002)	
)	Confirmation Number: 7324
Jet Fuels With Improved Flow)	Group Art Unit: 1764
Properties)	
)	Family Number: P1999S008

Commissioner for Patents
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Alexandria, VA 22313-1450

Sir:

**APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192**

Applicant hereby appeals from the Final Rejection of all the claims in this case by the Examiner.

CERTIFICATION OF FACSIMILE TRANSMISSION		
I hereby certify that this paper is being facsimile transmitted to the Commissioner for Patents facsimile number 1-703-872-9306 on the date shown below.		
Kathleen A. KUNA	Kathleen A. Kuna	MAY 24 2005
Name of person signing certification	Signature	Date



27810

PATENT TRADEMARK OFFICE

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 2

(1) Real Party in Interest

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U.S. Serial No. 10/089,310
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Family Number: P1999S008

Page 3

boiling within the range of 140 to 250°C (page 3, line 14) and a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil which naphtha fraction has a distillation range of $T_5=165^{\circ}\text{C}$ to $T_{90}=210^{\circ}\text{C}$ (page 3, lines 14-16) an aromatic content of at least 50% by volume (page 3, line 17) such that the resultant jet fuel blend has a freezing point below that of the kerosene prior to blending (page 3, line 17-18) and the total aromatic content of the blend is in the range from 15-25% by volume of the total blend (page 4, lines 4-5). Preferably the kerosene fraction has a boiling range of $T_5=145^{\circ}\text{C}$ to $T_{95}=248^{\circ}\text{C}$ (page 3, lines 20-21). More preferably the kerosene fraction has a boiling range of $T_5=150^{\circ}\text{C}$ to $T_{95}=245^{\circ}\text{C}$ (page 3, lines 21-22). The blend has a freezing point below -53.5°C (page 5, line 8). The blend can contain 80-99% by volume of the kerosene fraction (page 3, line 24). The naphtha fraction (HCCN) can be one which is substantially unhydrorefined and has a boiling range of $T_5=165^{\circ}\text{C}$ to $T_{95}=210^{\circ}\text{C}$ (page 3, line 35 to page 4, line 2). In another embodiment the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend (page 4, lines 5-6). The jet fuel blend can contain one or more additives selected from anti oxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes (page 5, lines 15-19).

(6) Issues

Whether the Examiner properly rejected composition claims 1-8 and method claims 9-16 under 35 USC § 103(a) based on GB 735134.

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Applicant elects to have claims 1-8 and claims 9-16 treated as separate groups.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 4

(8) Argument

It is maintained that the Examiner's rejection of claim 1-8 and 9-16 under 35 USC § 103(a) based on GB 735134 is not proper.

The present invention embraced by claims 1-8 is directed to the discovery of a jet fuel comprising more than 75 vol% of a kerosene fraction boiling in the range of 140°C to 250°C and a minor amount of a naphtha fraction made by catalytic cracking of a heavy gas oil (HCCN) which has a distillation range of $T_5 = 165^\circ\text{C}$ to $T_{90} = 210^\circ\text{C}$, and an aromatic content of at least 50 vol% such that upon blending the resultant jet fuel blend has a freezing point lower than that of the kerosene prior to the blending, the total aromatic content of the blend being in the range of 15-25 vol% of the total blend.

The present invention, embraced by claims 9-16 is also directed to a method for producing a jet fuel blend having a freezing point lower than that of the primary kerosene component prior to blending comprising combining more than 75% by volume of kerosene having a boiling range between 140°C to 250°C with a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (HCCN) which naphtha has a boiling range of $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$ and an aromatic content of at least 50% by volume to produce a jet fuel blend of reduced freeze point and a total aromatic content in the range of 15-25% by volume of the total blend.

The Examiner rejects the claimed invention under 35 U.S.C. § 103(a) as obvious over GB 735,134.

The Examiner argues that GB 735,134 discloses a process for producing a jet fuel comprising a kerosene fraction and a naphtha fraction.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 5

The Examiner points out that in GB 735,134 the naphtha fraction produced by cat cracking has a boiling point (actually a boiling range) of 138 to 177°C while the kerosene has a boiling point (again, actually boiling range) of 167 to 287°C, the naphtha fraction being rich in aromatics, wherein, upon blending the recited kerosene fraction and naphtha fraction the resulting blend has a total aromatics content of about 20 to 25 wt%. In producing the blend GB 735,134 recites that the heavy naphtha fraction boiling between (i.e., having a boiling range of 280°F to 350°F and containing C₈-C₉ aromatics is blended with the kerosene in an amount sufficient to contribute at least from 0.5 to 2.0% by volume of C₈-C₉ aromatics to the blend, the final jet fuel blend having a freezing point of lower than -76°F (60°C).

The Examiner concludes that it would be expected that the jet fuel would have a freezing point below that of the kerosene prior to blending as is claimed in the present application.

The Examiner argues that it would have been obvious to use naphtha fractions and kerosene fractions having the claimed range because one of skill in the art would utilize any naphtha fraction having a boiling point of from 280-350°F (138-177°C) and any kerosene fraction having a boiling point of from 330-550°F (167-287°C) including the overlapping claimed ranges with the expectation that any fraction having a boiling point within the range would give similar results.

Applicant respectfully traverses this rejection.

GB 735,134 teaches a very specific fuel composition with respect to the jet fuel aspect of its disclosure.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 6

The jet fuel comprises kerosene and C_8 - C_9 aromatics, this particular jet fuel composition being marked by an ability to resist fuel filter plugging by ice crystals.

The text at page 3, columns 32-39, is specific in its recitation that it is the C_8 - C_9 aromatics that are particularly beneficial in the fuels.

The naphtha fraction is identified as that boiling in the 280-350°F (138-177°C) range. It must be noted from page 6, lines 20-29, that C_8 and C_9 aromatics are again identified, the highest boiling C_8 aromatics being orthoxylene (BP 291.95°F or about 144°C), the highest boiling C_9 aromatic being hemimellitene (BP 335°F or about 168°C).

Thus, the boiling range for the naphtha of between about 138-177°C is not arbitrary nor non-limiting or merely suggestive of other broader ranges.

When GB 735,134 recites a naphtha boiling range of 280-350°F (138-177°C), it means precisely this range.

Boiling range should not be confused with boiling point. A pure compound has a discrete boiling point. Mixtures of compounds such as naphtha have boiling ranges. A naphtha defined as having a boiling range between $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$ is not the same material as a pure compound having a discrete boiling point nor is it the same as a mixture having a boiling range between 138-177°C, despite what appears to be an overlap.

The naphtha having a boiling range of $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$ defines a material at which at 165°C 5% of the material boils off and at 210°C 95% of the material boils off. This product boiling between $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$ defines the naphtha fraction used in the present invention.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 7

This fraction is heavier than, and outside the range of material covered in GB 735,134 in its definition of C₈-C₉ aromatics boiling in the range 280-350°F (i.e., 138-177°C), that is, a naphtha fraction having an end point temperature of 350°F (177°C).

A naphtha fraction having an end point of 177°C is much lighter and much different than a naphtha fraction boiling between T₅ = 165°C to T₉₅ = 210°C, the end point being even a few degrees C higher than the T₉₅ = 210°C temperature.

Thus, the fractions are not the same despite what appears to be an area of overlap. The recitation of a boiling range or an end point of 350°F does not teach, suggest or imply using or isolating a particular single molecule at a single temperature in the range but rather using a fraction boiling within the entire recited range. In the present invention the naphtha fraction used is the whole fraction boiling between T₅ = 165°C to T₉₅ = 210°C, whereas in the reference the aromatic are C₈-C₉ aromatics or naphtha fraction having an end point of 350°F (~ 177°C), that is, material boiling above 177°C is excluded.

This teaching of a naphtha fraction having an end point of 350°F (~ 177°C) does not teach, suggest or imply using a naphtha fraction having a T₉₅ point of 210°C, nor, based on the teaching of the entire reference does it teach, suggest or imply that the freeze point of kerosene, the temperature at which wax crystallizes, can be lowered by adding such a T₅ = 165°C to T₉₅ = 210°C naphtha fraction to such kerosene.

The recitation in the reference that it is an object of the reference invention to produce a jet fuel with a freeze point of -76°F (-60°C) should not and cannot be read as a teaching that it is the addition of the C₈-C₉ aromatics which achieves this freeze

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 8

point. The -76°F (-60°C) freeze point temperature is merely the repetition of the heretofore recited JP-1, JP-3 and JP-4 turbine fuel freezing point specification from Table 1.

In Table 1, the specification is for jet fuel of any type produced by any technique. The -76°F freeze point specification in Table 1, therefore, is not a recitation that the jet fuel of the reference achieves that temperature by the addition of C₈-C₉ aromatics, but is rather a recitation that regardless of how the fuel is finally prepared the fuel has to have or meet a freeze point spec of -76°F (-60°C) or else be rejected as "off-spec".

The -76°F temperature is just the government's military specification for the acceptable freeze point of jet fuel.

It is not specified in the Mil-Spec just how this is to be achieved. A freeze point of -76° could be reached by use of approved wax crystal modifier/pour point/freeze point depressant additives such as those taught in EP-A-0282342, cited at page 1 of the present application.

The present reference, specifying that it reduces the ability of jet fuel to form ice crystals by the addition of C₈-C₉ aromatic (naphtha with an end point of 350°F (~ 177°C)) does not teach, suggest or imply that kerosene can have its wax crystal formation freeze point lowered by the addition thereto of a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil which naphtha fraction has a boiling range of T₅ = 165°C to T₉₅ = 210°C.

The Examiner rejects claims 1, 3 and 4 over GB 735,134 arguing that although the reference does not disclose the claimed boiling ranges of the naphtha and kerosene fractions the reference discloses that the naphtha fraction has a "boiling

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 9

point" of from 280°F to 350°F (138-177°C) and the kerosene has a "boiling point" of from 330-550°F (167-287°C).

The Examiner by arguing that it would have been obvious to utilize naphtha and kerosene fractions having the presently claimed ranges because "one of skill in the art would utilize any naphtha fraction having a boiling point of from 280-350°F (138-177°C) or kerosene fraction having a boiling point of from 330-550°F (167-287°C) including the overlapped claimed ranges with the expectation that any fraction having a boiling point within the ranges would give similar results" is clearly indicating that he is confusing boiling point and boiling range. Boiling "point" and boiling "range" are not the same.

As previously indicated kerosene and naphtha are not discrete, pure, individual hydrocarbons but mixtures of hydrocarbons.

When discussing a hydrocarbon mixture one does not talk about boiling point but rather the boiling range over which material is recovered, i.e., the fraction is identified in terms of the temperature range over which it is recovered, e.g., $T_5 = 165^\circ\text{C}$ to $T_{95} = 210^\circ\text{C}$. Such fractions have an initial boiling point, a temperature at which a first drop of material is recovered and a final boiling point, a temperature at which a last or final drop of material is recovered, the initial boiling point and final boiling point constituting the boiling range.

In the reference the kerosene is defined as boiling between 330 to 550°F, that is the kerosene used in the reference is that fraction which is recovered with a first drop at 330°F and the last drop at 550°F. Those portions boiling below 330°F and above 550°F are excluded. Similarly, defining the naphtha as boiling between 280°F to 350°F (138-177°C) defines a naphtha fraction the first drop of which is recovered at 280°F and the last drop of which is recovered at 350°F. This entire fraction

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 10

recovered at between 280°F to 350°F is the fraction used or suggested in the GB reference.

In the present invention the cat naphtha used is the complete fraction having a boiling range between T₅ of 165°C to T₉₅ of 210°C. In the present invention use is not being made of some arbitrary sub-fraction recovered from the material boiling between T₅ of 165°C to T₉₅ of 210°C but rather the complete range of material boiling between these temperatures is used in its entirety.

The Examiner, from the quoted language, appears to be indicating that it would have been obvious to use a subfraction boiling at a particular temperature within the range recited in the GB reference and appears to be arguing that all applicant is doing is reciting a temperature range which overlaps that of the reference and that it would be obvious to take a particular sub-portion boiling at some arbitrary temperature, within the recited new temperature range and also within the range taught in the GB reference and use it in the present invention.

This is believed to be an error on the part of the Examiner.

Applicant recites a boiling range for the cat naphtha used in the present invention. That cat naphtha used in the present invention is the entire fraction boiling between a T₅ of 165°C to T₉₅ of 210°C, whereas the GB reference recites a naphtha fraction boiling between an initial boiling point of 138°C to a final boiling point of 177°C. In each instance it is the use of the entire fraction in producing the blend which is taught.

The present invention does not seek to claim the use of a particular limited portion of the fraction boiling between T₅ = 165°C and T₉₅ = 210°C but uses the entire fraction boiling between these limits.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 11

A hydrocarbon fraction boiling in the range initial boiling point 138°C to final boiling point of 177°C is not the same as a hydrocarbon fraction boiling in the range of T₅ of 165°C to T₉₅ of 210°C. The hydrocarbon fraction boiling in the range of T₅ of 165°C to T₉₅ of 210°C is heavier than the hydrocarbon fraction boiling in the range of initial boiling point 138°C to final boiling point 177°C.

Even when page 10, lines 83-98, are considered which recites at lines 92-94, the use of:

“(3) a heavy hydroformate or a heavy catalytic naphtha rich in C₈-C₉ aromatics and boiling from 250°F to 400°F” (about 121 to about 204°C)”,

the complete fraction recited in the present invention boiling between T₅ of 165°C to T₉₅ of 210°C, is seen to be different, the different boiling ranges of the fractions clearly defining different naphthas.

One skilled in the art does not expect different hydrocarbon fractions having different boiling ranges, even if there is some overlaps in the boiling range, to behave similarly.

The fraction taught by the reference boiling in the range of initial boiling point 138°C to final boiling point 177°C (or considering column 10, lines 92-94, initial boiling point 121°C to final boiling point 204°C) defines a hydrocarbon material containing a substantial amount of material which boils below the T₅ = 165°C of the cat naphtha hydrocarbon materials recited in the present invention, while the cat naphtha hydrocarbon used in the present invention having a T₉₅ = 210°C contains a significant amount of hydrocarbon materials boiling above the final boiling end point of 177°C or 204°C of the naphtha recited in the reference.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 12

The absence of the light ends from, and presence of the heavier ends in, the cat naphtha used in the present invention as compared to the naphtha recited in GB reference reveals that the two fractions are different and the teaching of the GB reference does not teach, suggest or imply that a jet fuel can or should be made using the cat naphtha recited in the present invention ($T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$) or that the freeze point of a jet fuel can be reduced to a temperature below that of the starting kerosene by addition thereto of such a different cat naphtha of such a different boiling range.

With respect to the method claims, it is believed the method of claims 9-16 is not taught, suggested or implied by GB 735,134 for the same reasons that the fuel composition of claims 1-8 is not taught, suggested or implied by that reference as discussed above. The GB reference never prepared the present blend using the presently disclosed kerosene and naphtha fraction or measured its freeze point or suggested that the wax freeze point of kerosene based jet fuel could be reduced by addition to the kerosene of a quantity of the particular naphtha fraction recovered from the catalytic cracking of having gas oil which naphtha has a distillation range of $T_5 = 165^{\circ}\text{C}$ and $T_{95} = 210^{\circ}\text{C}$, because the reference only teaches and uses the very specific naphtha fraction boiling in the range of initial boiling point 138°C to final boiling point 177°C or initial boiling point 121°C to final boiling point 204°C (column 10, lines 92-94) whereas the cat naphtha used in the present method claims 9-16 is a different material than that taught in the reference as clearly indicated by the present cat naphtha having a different and unsuggested, untaught and unimplied boiling range.


U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 13

Relief Sought

It is requested that the Board reconsider this case in light of the above remarks, that it reverse the Examiner, direct that the rejections be withdrawn, the claims be allowed and the case be passed to issue in due course. Applicant's attorney waivers oral hearing.

Respectfully submitted,



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☒ Pursuant to 37 CFR 1.34(a)

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U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 14

CLAIMS ON APPEAL

1. A jet fuel blend comprising more than 75 % by volume of a kerosene fraction boiling within the range of 140° to 250°C and a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (hereafter "HCCN") which naphtha fraction has a distillation range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$, an aromatics content of at least 50 % by volume such that the resultant jet fuel blend has a freezing point below that of the kerosene prior to blending and that the total aromatic content of the blend is in the range from 15-25% by volume of the total blend.
2. The blend according to Claim 1 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 145^{\circ}\text{C}$ to $T_{95} = 248^{\circ}\text{C}$.
3. The blend according to Claim 1 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 150^{\circ}\text{C}$ to $T_{95} = 245^{\circ}\text{C}$.
4. The blend according to Claim 1, 2 or 3 wherein the freezing point of the blend is below -53.5°C .
5. The blend according to Claim 1, 2 or 3 wherein the amount of the kerosene fraction in the jet fuel blend is in the range of 80-99% by volume of the total blend comprising the kerosene fraction and the HCCN.
6. The blend according to Claim 1, 2 or 3 wherein the HCCN fraction is substantially unhydrorefined and has a boiling range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$.
7. The blend according to Claim 1, 2 or 3 wherein the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 15

8. The jet fuel blend composition according to Claim 1, 2 or 3 wherein said composition also contains one or more additives selected from antioxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes.

9. A method for producing a jet fuel blend comprising kerosene which blend has a freezing point below that of the kerosene prior to the blending comprising combining a minor amount of a naphtha fraction produced by the catalytic cracking of heavy gas oil (hereafter HCCN) which naphtha fraction has a distillation range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$ and an aromatic content of at least 50% by volume with a kerosene fraction comprising more than 75% by volume of the jet fuel blend, said kerosene fraction boiling in the range of 140° to 250°C , such that upon blending the resultant jet fuel blend has a total aromatic content in the range from 15-25% by volume of the total blend.

10. The method according to Claim 9 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 145^{\circ}\text{C}$ to $T_{95} = 248^{\circ}\text{C}$.

11. The method according to Claim 9 wherein the kerosene fraction forming the major component of the blend has a boiling range of $T_5 = 150^{\circ}\text{C}$ to $T_{95} = 245^{\circ}\text{C}$.

12. The method according to Claim 9, 10 or 11 wherein the freezing point of the blend is below -53.5°C .

13. The method according to Claim 9, 10, or 11 wherein the amount of the kerosene fraction in the jet fuel blend is in the range of 80-99% by volume of the total blend comprising the kerosene fraction and the HCCN.

U.S. Serial No. 10/089,310
APPEAL TO THE BOARD OF PATENT APPEALS
AND INTERFERENCES PURSUANT TO 37 CFR 1.192
Family Number: P1999S008

Page 16

14. The method according to Claim 9, 10, or 11 wherein the HCCN fraction is substantially unhydrorefined and has a boiling range of $T_5 = 165^{\circ}\text{C}$ to $T_{95} = 210^{\circ}\text{C}$.

15. The method according to Claim 9, 10, or 11 wherein the amount of HCCN in the blend is from 0.5 to 15% by volume of the total blend.

16. The jet fuel blend composition according to Claim 9, 10 or 11 wherein said composition also contains one or more additives selected from antioxidants, static dissipaters, metal deactivators, lubricity improvers, fuel system icing inhibitors, thermal stability improvers, drag reducing agents and dyes.